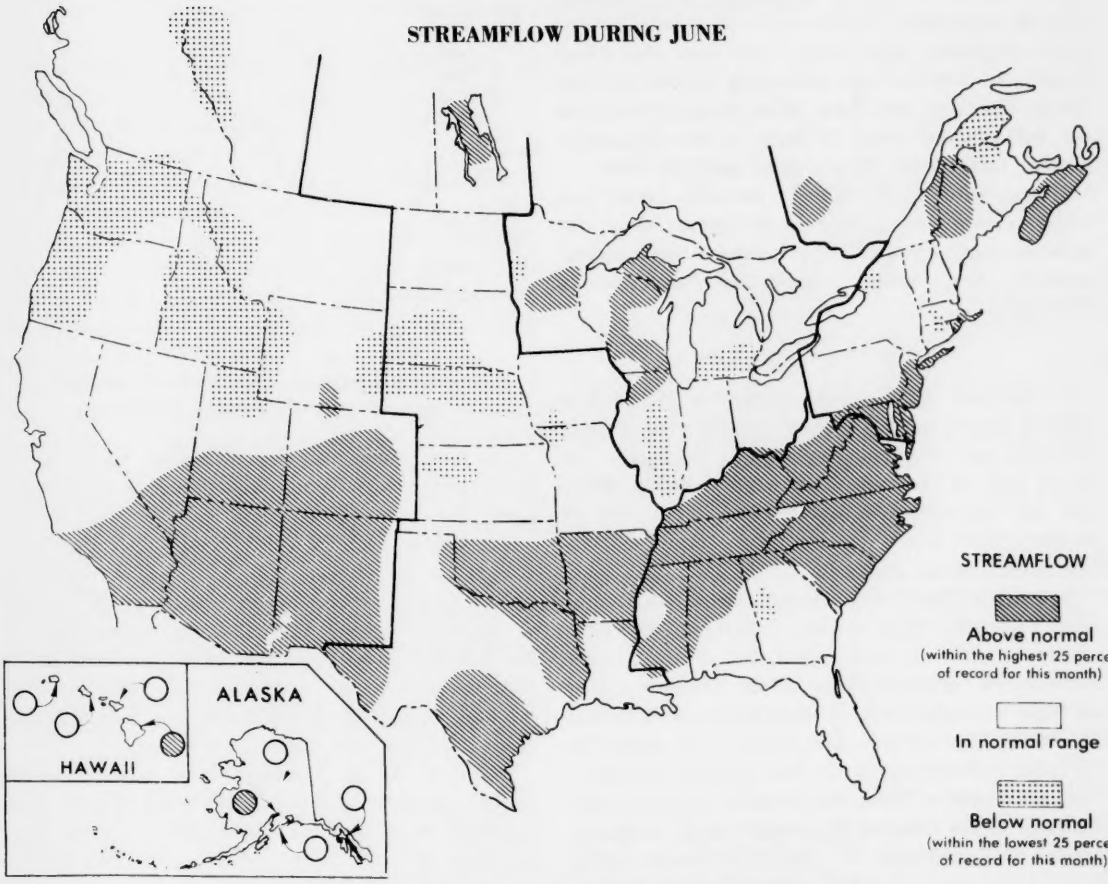
WATER RESOURCES REVIEW for JUNE 1979

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

CANADA
DEPARTMENT OF THE ENVIRONMENT
WATER RESOURCES BRANCH



STREAMFLOW AND GROUND-WATER CONDITIONS

Streamflow increased seasonally in Alberta, British Columbia, Manitoba, Alaska, Colorado, and Wyoming, was variable in Florida, Hawaii, Indiana, Kansas, Maryland, Montana, New Mexico, North Carolina, Ohio, South Carolina, South Dakota, Utah, and Virginia, and generally decreased seasonally elsewhere.

Monthly mean flows remained in the above-normal range in large areas centered on Arizona and Tennessee, and in smaller parts of Quebec, Illinois, New Jersey, New York, Michigan, Minnesota, Rhode Island, and Wisconsin. Below-normal streamflow persisted in parts of Alberta and South Dakota, and decreased into that range in significant parts of the Pacific Northwest. Flooding occurred in Indiana, Kansas, Montana, Nebraska, North Carolina, and Oklahoma. Mean flows were highest of record for the month in parts of New Mexico.

Ground-water levels in the Northeast Region generally declined, and were mostly in the normal range but above-average in southern New England, southern New Jersey, eastern Maryland, and in Delaware. Levels mostly declined also in the Southeast Region, except for local rises in Virginia, North Carolina, and Florida; levels were generally above average. In the Western Great Lakes Region, levels rose in Wisconsin and Indiana, but trends were generally mixed elsewhere; levels were average or above-average. In the Midcontinent, levels mostly declined and were mixed with respect to average. Trends were mixed in the West, and above and below average.

New high ground-water levels for June were reached in southern California, Kentucky, Michigan, Utah, and West Virginia. New lows for June occurred in Arizona, Arkansas, Idaho, Kansas, New Mexico, Tennessee, and Utah. New alltime lows were reached in Idaho, Louisiana, Nevada, and Texas.

NORTHEAST

[Atlantic Provinces and Quebec; Delaware, Maryland, New York, New Jersey, Pennsylvania, and the New England States]

Streamflow decreased seasonally throughout the region except for parts of Quebec and Maryland. Monthly mean flows remained above the normal range in parts of Quebec, New Jersey, New York, and Rhode Island, and increased into that range in parts of Nova Scotia, Maryland, and Maine. Mean flows decreased into the below-normal range in parts of New Brunswick, Quebec, Connecticut, Massachusetts, and New York.

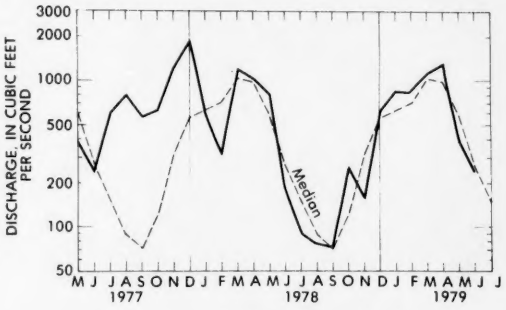
Ground-water levels generally declined. Levels near end of month were mostly in the normal range, but above-average levels occurred in southern New England, southern New Jersey, eastern Maryland, and in Delaware.

STREAMFLOW CONDITIONS

In Maryland and Delaware, streamflow increased in contrast to the normal seasonal pattern of decreasing flow, and was above the normal range throughout the bistate area. In Choptank River basin in eastern Maryland and adjacent areas of Delaware, mean flow as measured near Greensboro increased sharply and was over 6 times median during June.

In southern New Jersey, monthly mean discharge of Great Egg Harbor River at Folsom decreased seasonally, was about twice the June median, and remained in the above-normal range. Similarly, in the northern part of the State, mean flow of South Branch Raritan River near High Bridge was 221 percent of median and remained in the above-normal range for the 2d consecutive month.

In northwestern Pennsylvania, where monthly mean discharge of Oil Creek at Rouseville was in the below-normal range and only 64 percent of median during May, the seasonal decrease in flow was less than normal in June and mean flow was within the normal range and only slightly below median. (See graph.) Monthly mean flows at the remaining index stations in the State also decreased seasonally and were near or slightly below median as a result of below-normal precipitation during the month.



Monthly mean discharge of Oil Creek at Rouseville, Pa. (Drainage area, 300 sq mi; 777 sq km)

On Long Island, New York, monthly mean flow of Massapequa Creek at Massapequa decreased seasonally to twice the June median flow, but remained in the above-normal range for the 6th consecutive month. By contrast, in the northern part of New York, mean flow of West Branch Oswegatchie River at Harrisville was only 75 percent of median and below the normal range for the first time since November 1978. Elsewhere in the State, mean flows decreased seasonally, were generally less than median, but within the normal range as a result of below-normal precipitation during June.

North of the St. Lawrence River in southwestern Quebec, monthly mean flow of Harricana River at Amos decreased seasonally to 150 percent of median but remained in the above-normal range for the 2d

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consecutive month. In the eastern part of the Province but south of the St. Lawrence River, where mean flow of Matane River near Matane was above the normal range during the period February–May, flow decreased sharply to only 68 percent of median during June and was below the normal range. Elsewhere in the Province, mean flows generally decreased seasonally and were above median but within the normal range.

In northern New Brunswick, where mean discharge of Upsalquitch River at Upsalquitch was in the normal range and 108 percent of median during May, monthly mean flow decreased sharply to 62 percent of median and was below the normal range. In southern Nova Scotia, monthly mean flows of LaHave River at West Northfield and St. Marys River at Stillwater decreased seasonally, but by less than the normal amount, and were in the above-normal range. Runoff from frequent heavy rains, early in the month, sustained flows throughout most of the Atlantic Provinces.

In northern Maine, monthly mean discharge of St. John River below Fish River, at Fort Kent, decreased seasonally but was above the normal range as a result of high carryover flow from May, augmented by increased runoff from rains early in the month. In the central part of the State, mean flow of Piscataquis River near Dover-Foxcroft also decreased seasonally but by less than the normal amount, and was above the normal range at 252 percent of median. In the southern part of the State, mean flows were above median but within the normal range.

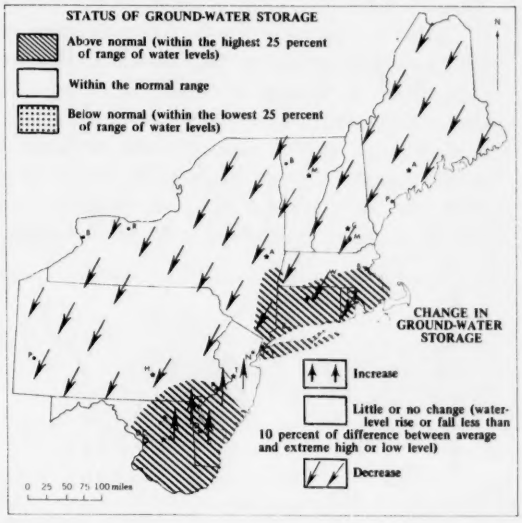
In Rhode Island, monthly mean discharge at the index station, Branch River at Forestdale remained in the above-normal range for the 2d consecutive month and was 1½ times the June median flow.

In central Massachusetts, mean flow of Ware River at Intake Works near Barre decreased sharply to 74 percent of median and was below the normal range for the first time since December 1978.

In adjacent Connecticut, monthly mean discharge of Mount Hope River near Warrenville, in the northeastern part of the State, was also in the below-normal range and only 68 percent of the June median. Elsewhere in central New England, mean flows were near or slightly below median but within the normal range.

GROUND-WATER CONDITIONS

Ground-water levels declined in most of the region. (See map.) However, levels rose in parts of New Jersey and adjoining areas of southeastern Pennsylvania and northern Delaware. Levels near end of month remained above average in southern New England. They were above average also in a few other areas including Long Island, N.Y., parts of southern New Jersey and eastern Maryland, and in Delaware. Elsewhere, levels were generally in the normal range for this time of year.



Map shows ground-water storage near end of June and change in ground-water storage from end of May to end of June.

SOUTHEAST

[Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, Tennessee, Virginia, and West Virginia]

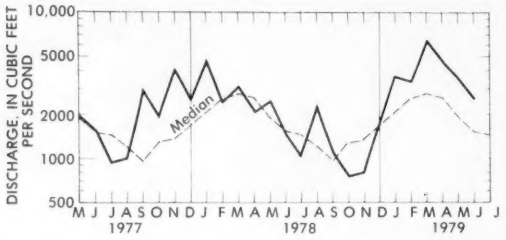
Streamflow decreased seasonally in Georgia, Mississippi, Tennessee, and West Virginia, increased in Kentucky and Virginia, and was variable elsewhere in the region. Monthly mean flows remained in the above-normal range in parts of Georgia, Mississippi, North Carolina, South Carolina, Tennessee, Virginia, and West Virginia, and increased into that range in parts of Alabama and Kentucky. Mean flows decreased into the below-normal range in parts of Georgia. Flooding occurred in North Carolina.

Ground-water levels declined in Alabama and Mississippi, and generally declined in West Virginia, Kentucky, and Georgia; trends were mixed in other States. Levels were above average in Alabama and in most of Kentucky, and were generally mixed above and below average elsewhere. New high levels for June were recorded in West Virginia and Kentucky, and a new low for June was reached in Tennessee.

STREAMFLOW CONDITIONS

In North Carolina, rapid runoff from intense rainfall in some parts of the west-central Piedmont resulted in minor flooding along many small streams on the 17th.

Monthly mean discharge of South Yadkin River near Mocksville, in that area, remained above the normal range and was 213 percent of median. In the extreme western part of the State, mean flow of French Broad River at Asheville decreased seasonally but remained in the above-normal range for the 6th consecutive month. (See graph.) In the eastern Piedmont, mean flow of Cape Fear River at William O. Huske Lock near Tarheel continued to decrease seasonally but remained above the normal range. In the adjacent basin of Neuse River, mean flow near Clayton increased, as a result of runoff from rains early in the month, and remained above the normal range for the 5th time in the past 6 months.



Monthly mean discharge of French Broad River at Asheville, N.C. (Drainage area, 945 sq mi; 2,448 sq km)

In northeastern South Carolina, monthly mean discharge of Pee Dee River at Peedee increased, contrary to the normal seasonal pattern of decreasing flow, remained in the above-normal range, and was 2½ times the median flow for June. In the adjacent basin of Lynches River, mean discharge at Effingham decreased seasonally but remained in the above-normal range as a result of high carryover flow from May. In the central part of the State, mean flow of North Fork Edisto River at Orangeburg increased, contrary to the normal seasonal pattern, remained above the normal range, and was twice the median flow for the month.

In southeastern Virginia, mean flow of Nottaway River near Stony Creek decreased seasonally but remained in the above-normal range for the 7th consecutive month as a result of high carryover flow from May. Elsewhere in the State, mean flows increased, contrary to the normal seasonal pattern of decreasing flow, but were above the normal range and were 4 to 5 times the median flows for June. For example, in the northern and central parts of the State, mean flows of Rapidan River near Culpeper and Slate River near Arvonia, respectively, were in the above-normal range and were 383 percent and 487 percent of median. Similarly, in extreme western Virginia, monthly mean flow of North Fork Holston River near Saltville increased, was above the normal range, and was 541 percent of the median discharge for June.

In West Virginia, monthly mean flows decreased seasonally but were above the normal range throughout the State. In the eastern and southwestern parts of the State, mean flows of Greenbrier River at Alderson and Kanawha River at Kanawha Falls, respectively, remained in the above-normal range and were 3½ and 2½ times their respective median flows for June. In the extreme northern part of the State, mean flow of Potomac River at Paw Paw decreased seasonally but was above the normal range as a result of increased runoff early in the month.

In northern Kentucky, where monthly mean flow of Licking River at Catawba was below the normal range and only 60 percent of median in May, mean discharge increased sharply, as a result of runoff from rains early in the month, and was 5 times the median flow for June. In the southern part of the State, mean flow of Green River at Munfordville also increased, contrary to the normal seasonal pattern of decreasing flow, was above the normal range, and was 266 percent of median. Cumulative runoff at Munfordville for the first 9 months of the 1979 water year was 189 percent of median.

In the adjacent area of northern Tennessee, monthly mean flows of Harpeth River near Kingston Springs and Emory River at Oakdale decreased seasonally but were, respectively, about 2 and 3 times the median discharges for those stations, and remained in the above-normal range for the 3d consecutive month. Similarly, in the west-central part of the State, mean flow of Buffalo River near Lobelville decreased seasonally but remained above the normal range for the 3d consecutive month.

In northeastern Mississippi, monthly mean flow of Tombigbee River at Columbus continued to decrease seasonally but was 3½ times median and remained above the normal range for the 3d consecutive month. In the southeastern part of the State, mean flow of Pascagoula River at Merrill also decreased seasonally and was in the above-normal range. In the adjacent basin of Pearl River, mean flow as measured near the Mississippi-Louisiana border (near Bogalusa, La.) also decreased seasonally, and remained above the normal range for the 6th consecutive month. Cumulative runoff at that station for the first 9 months of the 1979 water year was 199 percent of median.

In northern Georgia, monthly mean discharge of Etowah River at Canton continued to decrease seasonally but remained in the above-normal range as a result of high carryover flow from May and increased runoff from rains early in June. In the eastern part of the State, mean discharge of Altamaha River at Doctortown decreased sharply from the above-normal flow of May, and was only 81 percent of median. In southern Georgia, mean flow of Alapaha River at Statenville also

decreased and was in the normal range but was greater than median. In the central part of the State, monthly mean flow of Flint River near Culloden continued to decrease seasonally, was only 67 percent of median, and was below the normal range.

In Florida, monthly mean flows were within the normal range throughout the State. In Peace River basin of west-central Florida, where monthly mean flow at Arcadia was 4½ times median in May, mean flow decreased, contrary to the normal seasonal pattern of increasing flow, and was only 78 percent of median. In southern Florida, where monthly flow of Fisheating Creek at Palmdale was 3,232 percent of median in May, mean flow increased seasonally but was only 187 percent of median. In the northwestern part of the State, mean flows in Apalachicola River at Chattahoochee and Shoal River near Crestview continued to decrease seasonally, were less than median, and remained within the normal range.

In the adjacent area of southeastern Alabama, monthly mean discharge of Conecuh River at Brantley continued to decrease seasonally but remained in the normal range and was greater than the median discharge for the month. In the central and west-central parts of the State, mean flows of Cahaba River at Centreville and Tombigbee River at Demopolis lock and dam, near Coatopa, respectively, also decreased seasonally but were above the normal range as a result of increased runoff from rains early in the month. In the extreme northeastern part of the State, monthly mean flow of Paint Rock River near Woodville increased, contrary to the normal seasonal pattern of decreasing flow, and was above the normal range as a result of runoff from rain early in the month.

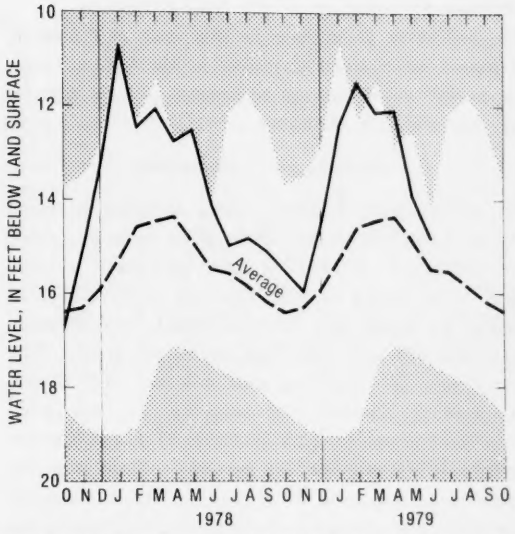
GROUND-WATER CONDITIONS

In West Virginia, ground-water levels declined nearly statewide. Levels were above average in the northern two-thirds of the State and below average in the southern third. The index water-table well at Glenville declined about ½ foot but was at a new high for June in 25 years of record.

In Kentucky, levels generally declined but were above average in most parts of the State. Although there was no net change of level in the water-table well in sand and gravel in Louisville, it was nevertheless at a new high level for June in 33 years of record.

In Virginia, the level in the Tyler well rose, but levels declined in the other two key wells. Levels were above average in the Tyler well in Louisa County, and in the Matoaka Manor well near Petersburg. (See graph.) The level was below average in the Bacon-Summerville well in northern Virginia.

In western Tennessee, the artesian level in the key well in the "500-foot sand" near Memphis declined about ½ foot, continued more than 15 feet below average, and reached a new low level for June.



Matoaka Manor well in Colonial Heights, Va., 3 miles north of Petersburg. Drilled unused water-table well in granite; depth, 100 ft.

In North Carolina, levels rose in the mountains and western Piedmont, and declined in the eastern Piedmont and Coastal Plain. Levels were above average in the mountains and Piedmont, and below average in the Coastal Plain.

In Mississippi, levels declined moderately statewide, owing to a very dry month and increased pumping for industrial and municipal supplies.

Levels declined in Alabama, and were above average.

In Georgia, levels in the Piedmont declined; they held steady in the coastal counties near Savannah, but declined 13 feet near Brunswick owing to resumption of industrial pumping after a partial shutdown in May. Levels in the water-table aquifer in the Savannah area continued above average. In the southwest, levels declined 1 to 4 feet.

In Florida, levels generally declined in the north, but rose in the central part of the State. Levels ranged from nearly 6 feet below average at Jacksonville to nearly 3½ feet above average at Tampa. In southeastern Florida, levels declined 1½ feet in Broward County and ½ foot in St. Lucie, Palm Beach, and Dade Counties. Levels were ½ to 1 foot below average.

WESTERN GREAT LAKES REGION

[Ontario; Illinois, Indiana, Michigan, Minnesota, Ohio, and Wisconsin]

Streamflow generally decreased in Illinois, Michigan, Minnesota, Ontario, and Wisconsin, and was variable in Indiana and Ohio. Monthly mean discharges remained above the normal range in parts of Illinois, Michigan, Minnesota, and Wisconsin. Flows decreased into the

below-normal range in parts of Illinois, Michigan, and Minnesota. Flooding occurred in parts of Indiana.

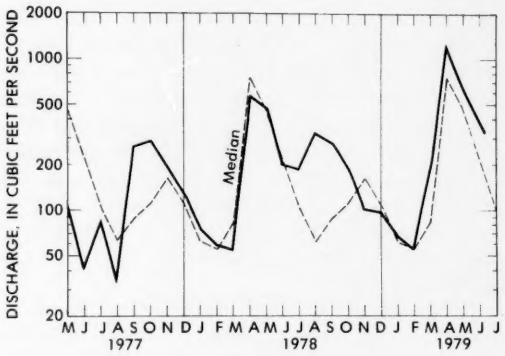
Ground-water levels rose in Wisconsin and Indiana, but trends were mixed elsewhere in the region. Levels were mostly above average or average. A new high for June was reached in Michigan.

STREAMFLOW CONDITIONS

In south-central Indiana, severe flooding occurred early in the month in the Patoka River basin and along some tributaries of the Ohio River, as a result of rapid runoff from record rainfall, reported to have been as much as 13 inches in a 36-hour period, near Marengo, during the 8th and 9th. Peak discharges greater than those of the 100-year flood were observed. Agricultural and property damage was reported to have been extensive in Crawford, Dubois, Perry, Pike, and Spencer Counties. In the southeastern part of the State, monthly mean flow of East Fork White River at Shoals continued to decrease and remained above median but was in the normal range. Similarly, in the Wabash River basin in western Indiana and the adjacent area of eastern Illinois, mean discharge of Wabash River at Mount Carmel, Ill., continued to decrease seasonally, was in the normal range, and was greater than median. In northeastern Indiana, monthly mean flow of Mississinewa River at Marion increased, contrary to the normal seasonal pattern of decreasing flow, was 164 percent of median and was in the normal range. Lake levels in the State were reported to be generally higher than normal as a result of runoff from above-normal rainfall.

In central Ohio, mean flow of Scioto River at Higby also increased, contrary to the normal seasonal pattern, and was 190 percent of median, but remained in the normal range. In northeastern Ohio, where monthly mean flow of Little Beaver Creek near East Liverpool was below the normal range and only 62 percent of median in May, flow continued to decrease seasonally but was 151 percent of median and was in the normal range for June. In the northwestern part of the State, mean flow of Maumee River at Waterville also decreased seasonally and was less than median but remained within the normal range. Contents of reservoirs in the Scioto River basin upstream from Higby were the same as last month, 2 percent less than a year ago, and 2 percent greater than normal capacity. Contents of reservoirs in the Mahoning River basin upstream from Newton Falls were 4 percent less than last month, the same as a year ago, and 69 percent of capacity.

In the southern part of Michigan's Lower Peninsula, monthly mean discharge of Red Cedar River at East Lansing decreased sharply, was below the normal range, and was only 40 percent of median. In the northern part of that peninsula, mean flow of Muskegon River at Evart also decreased seasonally but remained greater than median and was in the normal range. Levels of lakes in this part of the State generally were above normal at monthend. In the Upper Peninsula, mean discharge of Sturgeon River near Sidnaw decreased seasonally but remained above the normal range for the 4th consecutive month. (See graph.)



Monthly mean discharge of Sturgeon River near Sidnaw, Mich. (Drainage area, 171 sq mi; 443 sq km)

In southeastern Ontario, east of Lake Huron, monthly mean flow of Saugeen River near Port Elgin decreased sharply and was less than median, but remained within the normal range. In the southwestern part of the Province, mean flow of English River at Umfreville also decreased and was less than median but remained in the normal range for the 4th consecutive month.

In Minnesota, monthly mean flows decreased throughout the State and varied widely in relation to normal. For example, in the central part of the State, mean flow of Crow River at Rockford continued to decrease seasonally from the high flow of April but remained in the above-normal range for the 7th time in the past 9 months, and was 200 percent of median. By contrast, in northwestern Minnesota, mean flow of Buffalo River near Dilworth decreased sharply, was below the normal range, and was only 65 percent of median. Elsewhere in the State, monthly mean flows were greater than median and were in the normal range.

In Wisconsin, monthly mean flows generally decreased seasonally, remained in the normal range, and were well above the median discharges for the month. In northern and central parts, however, monthly mean discharge of Oconto River near Gillett and Wisconsin River at Muscoda, respectively, decreased seasonally but remained in the above-normal range as a result of high carryover flow from May, augmented by runoff from rains in the last half of the month.

In northern Illinois, mean flow of Rock River near Joslin continued to decrease seasonally but remained

(Continued on page 8.)

SELECTED DATA FOR THE GREAT LAKES, GREAT SALT LAKE, AND OTHER HYDROLOGIC SITES

GREAT LAKES LEVELS

Water levels are expressed as elevations in feet above International Great Lakes Datum 1955

(Data furnished by National Ocean Survey, NOAA, via U.S. Army Corps of Engineers office in Detroit. To convert data to elevations above mean sea level datum of 1929, add the following values: Superior, 0.96; Michigan-Huron, 1.20; St. Clair, 1.24; Erie, 1.57; Ontario, 1.22.)

Lake	June 30, 1979	Monthly mean, June		June		
		1979	1978	Average 1900–75	Maximum (year)	Minimum (year)
Superior (Marquette, Mich.)	601.46	601.29	600.69	600.67	601.64 (1951)	598.63 (1926)
Michigan and Huron (Harbor Beach, Mich.)	579.90	579.82	578.86	578.54	580.89 (1973)	575.90 (1964)
St. Clair (St. Clair Shores, Mich.)	575.06	575.08	574.75	573.77	576.23 (1973)	571.74 (1934)
Erie (Cleveland, Ohio)	572.10	572.19	572.25	570.96	573.51 (1973)	568.46 (1934)
Ontario (Oswego, N.Y.)	245.77	245.97	246.30	245.55	248.06 (1952)	242.91 (1935)

GREAT SALT LAKE

Alltime high: 4,211.6 (1873). Alltime low: 4,191.35 (October 1963).	June 30, 1979	June 30, 1978	Reference period 1904–78		
			June average, 1904–78	June maximum (year)	June minimum (year)
Elevation in feet above mean sea level:	4,199.25	4,199.95	4,198.90	4,204.80 (1923)	4,192.75 (1963)

LAKE CHAMPLAIN, AT ROUSES POINT, N.Y.

Alltime high (1827–1977): 102.1 (1869). Alltime low (1939–1977): 92.17 (1941).	June 28, 1979	June 30, 1978	Reference period 1939–78		
			June average, 1939–78	June max. daily (year)	June min. daily (year)
Elevation in feet above mean sea level:	96.33	97.17	96.91	101.02 (1947)	94.35 (1965)

FLORIDA

Site	June 1979		May 1979	June 1978
	Discharge in cfs	Percent of normal	Discharge in cfs	Discharge in cfs
Silver Springs near Ocala (northern Florida)	780	104	750	830
Miami Canal at Miami (southeastern Florida)	320	99	623	284
Tamiami Canal outlets, 40-mile bend to Monroe	48	49	60	250

(Continued from page 6.)

above the normal range as a result of high carryover flow from May and increased runoff from rains early in June. In central and southern parts of the State, monthly mean flows of Sangamon River at Monticello and Skillet Fork at Wayne City decreased sharply, were only 46 percent and 24 percent of median, respectively, and were below the normal range.

GROUND-WATER CONDITIONS

Levels in shallow water-table wells in Minnesota rose and were above average in the north, but declined in the south. In the Minneapolis-St. Paul area, trends were mixed in both water-table and artesian aquifers.

In Wisconsin, levels rose statewide; the greatest rises occurred in the northwest. Levels were average or above average.

In Michigan, levels rose in the Upper Peninsula but declined in the Lower Peninsula. Levels were near or above average. A new June high level was reached in the key well in glacial drift in the western part of the Upper Peninsula, at Ishpeming, in 17 years of record.

In Illinois, the level in the shallow well in glacial drift at Princeton, Bureau County, declined 2 feet but was 1 foot above average at month's end.

Levels in Indiana rose slightly statewide and were generally slightly above average.

In Ohio, levels declined slightly or held nearly steady, and continued about average.

MIDCONTINENT

[Manitoba and Saskatchewan; Arkansas, Iowa, Kansas, Louisiana, Missouri, Nebraska, North Dakota, Oklahoma, South Dakota, and Texas]

Streamflow generally increased in Manitoba and Oklahoma, decreased in Saskatchewan, Arkansas, Iowa, Louisiana, Missouri, Nebraska, and North Dakota, and was variable in Kansas, South Dakota, and Texas. Monthly mean flows remained in the above-normal range in parts of Arkansas, Louisiana, and Texas, and increased into that range in parts of Manitoba and Oklahoma. Mean flows remained in the below-normal range in parts of South Dakota, and decreased into that range in parts of Kansas and Nebraska. Flooding occurred in parts of Kansas, Nebraska, and Oklahoma.

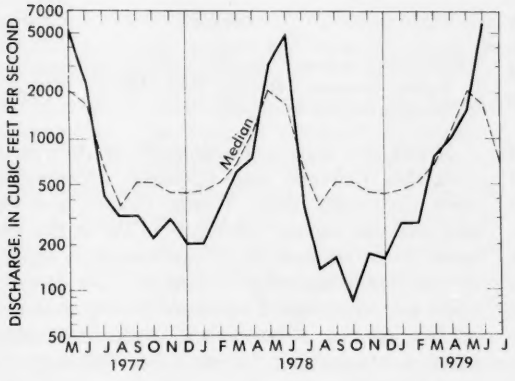
Ground-water levels generally declined in the region, except for local rises in Kansas, Arkansas, and Texas. Levels were above average in Iowa, slightly above average in North Dakota, above and below average in Texas, and below average elsewhere in the region. New low levels for June were recorded in Kansas and Arkansas; two new alltime low levels were recorded in Texas and another in Louisiana.

STREAMFLOW CONDITIONS

Severe flooding occurred along streams in the Walnut River basin in south-central Kansas early in the month as a result of rapid runoff from intense rainfall, reported by the National Weather Service to have been as much as 8.50 inches June 7–8. The peak stage of 25.65 feet (June 8) on Walnut River at El Dorado (25 miles northeast of Wichita) was 2.20 feet higher than the previous record crest, that occurred in 1965. Many homes were evacuated and the city water and power plants were inoperable during the flood. Downstream at Winfield (drainage area, 1,872 square miles), where records of streamflow of Walnut River were started in 1921, the crest stage of 35.7 feet, and the related discharge of 54,500 cfs on June 10 were appreciably less than the record stage and discharge of 38.3 feet and 105,000 cfs that occurred April 23, 1944. Moderate flooding occurred concurrently along streams in a 100-mile band from near Wichita to Paola, in eastern Kansas, in which area rainfall amounts of 6 to 8 inches were reported by the National Weather Service. In northeastern and southwestern parts of the State, in the Little Blue and Arkansas River basins, respectively, mean flows of Little Blue River near Barnes and Arkansas River at Arkansas City remained within the normal range. In northwestern Kansas, mean flow of Saline River near Russell decreased sharply, was only 24 percent of median, and was below the normal range for the 6th time in the past 9 months.

In south-central Oklahoma, rapid runoff from intense rainfall June 5–8 resulted in minor flooding along some of the major streams and caused flooding and related bridge damage on small streams in that area. In the southwestern part of the State, mean flow of Washita River near Durwood increased sharply, contrary to the normal seasonal pattern of decreasing flow, was in the above-normal range for the first time since August 1975, and was 3½ times the median discharge for June. (See graph on page 9.)

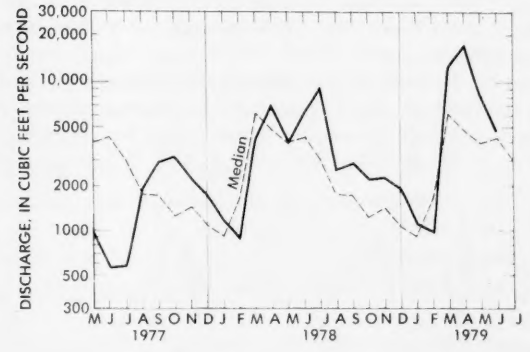
In southeastern Nebraska, minor flooding of agricultural lands occurred in the Big Blue River basin near monthend as a result of runoff from rainfall of as much as 4.70 inches (reported by the National Weather Service) June 28. In the western part of the State, flow of South Platte River at North Platte was highest for the month since 1973 as a result of the high rate of runoff from snowmelt in the mountains of Colorado. Flows continued to be low in the Republican River basin in southwestern Nebraska where unregulated flows ranged from 20 to 40 percent of normal. In eastern and northwestern parts of the State, mean flows of Elkhorn River at Waterloo and Niobrara River above Box Butte



Monthly mean discharge of Washita River near Durwood, Okla.
(Drainage area, 7,202 sq mi; 18,653 sq km)

Reservoir, respectively, decreased sharply, were in the below-normal range, and were only one-half the median flows for June at those sites.

In northwestern and southwestern Iowa, mean flows of Des Moines River at Ft. Dodge and Nishnabotna River above Hamburg, respectively, decreased, contrary to the normal seasonal pattern of increasing flows, were less than median, but were within the normal range. In the eastern part of the State, monthly mean discharge of Cedar River at Cedar Rapids also decreased, contrary to the normal seasonal pattern, but was greater than median. (See graph.)



Monthly mean discharge of Cedar River at Cedar Rapids, Iowa
(Drainage area, 6,510 sq mi; 16,861 sq km)

In northwestern Missouri, monthly mean discharge of Grand River near Gallatin decreased sharply into the below-normal range and was only 21 percent of median. This was the first month since February 1978 in which mean flow at this station was below the normal range. In the south-central part of the State, mean flow of Gasconade River at Jerome decreased seasonally and was less than median but was in the normal range.

In northern and southern Arkansas, monthly mean flows of Buffalo River near St. Joe and Saline River near Rye, respectively, decreased seasonally but remained in the above-normal range for the 4th consecutive month, and were about 3 and 11 times the respective June median discharge for those stations.

In extreme western Louisiana, monthly mean flows of Paw Paw Bayou near Greenwood and Bayou Toro near Toro were in the above-normal range. In the northwestern part of the State, mean discharge of Saline Bayou near Lucky decreased seasonally and was less than median but remained in the normal range. In central Louisiana, mean flow of Red River at Alexandria was above the normal range and 2 times the median discharge for June, and in the southeastern part of the State, monthly mean discharge of Amite River near Denham Springs decreased seasonally but remained above median and in the normal range. Mean flow of Pearl River near Bogalusa, also in southeastern Louisiana, continued to decrease seasonally but remained in the above-normal range for the 6th consecutive month.

In central Texas, monthly mean discharge of Guadalupe River near Spring Branch increased, contrary to the normal seasonal pattern of decreasing flow, and remained in the above-normal range for the 6th consecutive month and for the 10th time in the past 11 months. In the eastern part of the State, mean flow of Neches River near Rockland decreased seasonally, was 3 times median, and was in the above-normal range for the 3d time in the past 4 months. Mean flows also were above the normal range in the San Antonio, Nueches, and Angelina River basins, and were in the normal range elsewhere in the State.

In eastern South Dakota, monthly mean flow of Big Sioux River, as measured at Akron, Iowa, decreased, contrary to the normal seasonal pattern of increasing flow, but was in the normal range and was greater than the June median, as a combined result of high carryover flow from May and an increase in runoff late in the month. In the central part of the State, mean flow of Bad River near Fort Pierre also decreased, contrary to the normal seasonal pattern, remained in the below-normal range for the 3d consecutive month, and was only 30 percent of median. Cumulative runoff at this streamflow station for the first 9 months of the 1979 water year was only 13 percent of median. Cumulative precipitation levels in central and western parts of the State were reported by the South Dakota State Department of Natural Resources to be 25 to 50 percent below normal.

In eastern North Dakota, monthly mean flow of Red River of the North at Grand Forks continued to decrease seasonally from the high flows of April and May and was

in the normal range. In the southwestern part of the State, mean flow of Cannonball River at Breien decreased, contrary to the normal seasonal pattern for that site, and was only 40 percent of median, but was within the normal range.

In southeastern Saskatchewan, monthly mean flow of Qu'Appelle River near Lumsden decreased sharply but remained above median, and was in the normal range for the 11th consecutive month.

In southern Manitoba, mean discharge of Waterhen River below Waterhen Lake continued to increase seasonally and was in the above-normal range for the first time since September 1976. The level of Lake Winnipeg at Gimli averaged 715.56 feet above mean sea level for the month, 0.65 foot higher than last month, 1.53 feet higher than last June, and 1.63 feet higher than the long-term mean for June. Records of Lake Winnipeg levels were started in May 1913 at Winnipeg Beach.

GROUND-WATER CONDITIONS

In North Dakota, ground-water levels declined slightly in the eastern part of the State, and continued unchanged in the west; levels were slightly above average at month's end.

Levels generally declined statewide in Nebraska, and were slightly below average.

In Iowa, levels in shallow water-table wells declined statewide, but continued above average.

Levels rose slightly in key wells in eastern and southern Kansas. However, key wells in northwestern and south-central Kansas declined. Levels were generally below average statewide.

In Arkansas, the level in the key well in the Quaternary deposits of the rice-growing area in the east-central part of the State declined less than ¼ foot and was nearly 5 feet below average. The level in the deep Sparta Sand aquifer declined 33 feet, and was 14 feet below average. In the industrial aquifer—also the Sparta Sand—of central and southern Arkansas, the level in the key well rose and was 32½ feet below average, setting a new low level for June in 21 years of record.

In Louisiana, levels declined in the Miocene sands in the central part of the State and in the Sparta Sand in the north. Levels in the Mississippi River and Red River alluvial aquifers in central and northern Louisiana declined and were near average. Levels in the Chicot aquifer in the southwest declined owing to heavy pumping for rice irrigation.

In Texas, levels rose and were above average in the Edwards aquifer at Austin, and declined but were above average in the Edwards at San Antonio. Levels declined and were below average in the Evangeline aquifer at Houston, in the bolson deposits at El Paso, and in the Ogallala aquifer at Plainview in the Texas Panhandle. New alltime low levels were reached at El Paso and at Plainview.

WEST

[Alberta and British Columbia; Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming]

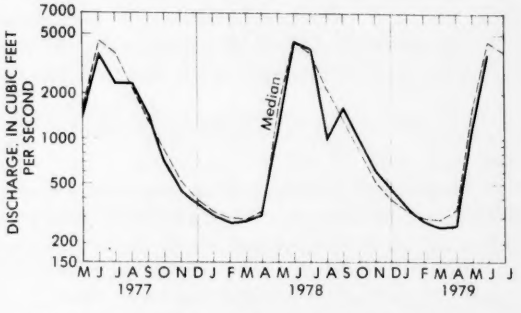
Streamflow increased seasonally in Alberta, British Columbia, Colorado, and Wyoming, decreased in Arizona, California, Idaho, Nevada, Oregon, and Washington, and was variable elsewhere in the region. Monthly mean flows remained in the above-normal range in parts of Arizona, California, Colorado, New Mexico, and Utah, and were highest of record for the month in parts of New Mexico. Below-normal streamflow persisted in parts of Alberta, and decreased into that range in parts of Idaho, Montana, Oregon, Utah, and Washington. Flooding occurred in Montana.

Ground-water levels showed mixed trends and were above and below average generally in the region. New high levels for June were noted in southern California and Utah, and new June lows occurred in Idaho, Utah, Arizona, and New Mexico. New alltime lows were recorded in Idaho and Nevada.

STREAMFLOW CONDITIONS

In central Montana, runoff from heavy rains of as much as 5 inches on June 18 produced the highest flows since 1943 on the Shields River, and since 1964 on the South Fork Judith River. This same storm caused local flooding on the Smith and Musselshell Rivers. In western Montana, monthly mean flow of Clark Fork at St. Regis decreased, in contrast to the normal seasonal pattern of increasing flow, and was below the normal range for the first time since January 1979. Elsewhere in the State, mean flows were below median but within the normal range.

In southwestern Alberta, monthly mean flow of Bow River at Banff continued to increase seasonally but remained below the normal range for the 4th consecutive month. (See graph.) Also in western Alberta,



Monthly mean discharge of Bow River at Banff, Alberta (Drainage area, 858 sq mi; 2,220 sq km)

monthly mean discharge in Athabasca River at Hinton increased seasonally to 73 percent of median but remained in the below-normal range.

In British Columbia, streamflow increased seasonally, was slightly less than median, and remained within the normal range at both index stations.

In Washington, streamflow was below the normal range throughout the State. In the lower elevations of southwestern Washington, monthly mean flow of Chehalis River near Grand Mound decreased to only 69 percent of median and was below the normal range for the first time since January 1979. Similarly, mean flow of Skykomish River near Gold Bar, representative of the higher elevations of western Washington, was only 81 percent of median. In the eastern part of the State, where monthly mean discharge of Spokane River at Spokane was above the normal range in May, flow decreased sharply and was only 72 percent of median during June.

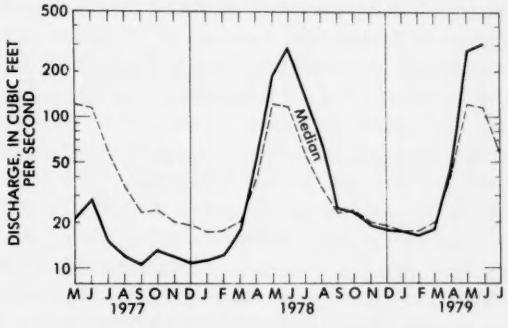
In Idaho, streamflow generally decreased as a result of below-normal precipitation and monthly mean flows at the index stations, Salmon River at White Bird and Snake River near Heise and at Weiser, were below the normal range. In the northern part of the State, monthly mean discharge of Clearwater River at Spalding decreased seasonally and was within the normal range at 85 percent of median. Elsewhere in the State, flows were also below the normal range in the Kootenai and Boise Rivers and within the normal range in the Coeur d'Alene River basin. Monthend reservoir storage was generally near average.

In southwestern Oregon, where monthly mean discharge of Umpqua River near Elkton was above the normal range and 155 percent of median in May, flow decreased sharply as a result of below-normal precipitation and was below the normal range for the first time since November 1978. In the northwestern part of the State, monthly mean flows at the index stations, Willamette River at Salem and Wilson River near Tillamook, also decreased sharply and were below the normal range. In the north-central part of the State, mean flow in John Day River at Service Creek decreased seasonally and was below median but within the normal range.

In south-coastal California, monthly mean discharge of Arroyo Seco near Pasadena continued to decrease seasonally but remained in the above-normal range for the 3d consecutive month and was greater than median for the 19th consecutive month. Cumulative runoff for the first 9 months of the 1979 water year was more than twice normal. In the southern Sierra Nevada west slope, flow in Kings River above North Fork, near Trimmer, decreased seasonally to 107 percent of median and was within the normal range. Elsewhere in the State, monthly mean discharges at index stations generally decreased seasonally and were below median but within the normal range. Combined contents of 10 reservoirs in northern California were 104 percent of average and 98 percent of the combined contents of last year.

In north-central Nevada, mean flow of Humboldt River at Palisade decreased, in contrast to the normal seasonal pattern of increasing flow, and was within the normal range at 96 percent of median. In the southeastern part of the State and the adjacent areas of Arizona and Utah, monthly mean flow of Virgin River, as measured at Littlefield, Ariz., decreased seasonally but remained in the above-normal range for the 5th consecutive month as a result of snowmelt runoff.

In southwestern Utah, monthly mean discharge of Beaver River near Beaver increased, contrary to the normal seasonal pattern of decreasing flow, and remained in the above-normal range for the 2d consecutive month. (See graph.) In the southeastern part of the



Monthly mean discharge of Beaver River near Beaver, Utah
(Drainage area, 90.7 sq mi; 235 sq km)

State, mean flow of San Juan River near Bluff decreased seasonally but remained in the above-normal range for the 5th consecutive month and was over 3 times the median flow. In east-central Utah, monthly mean flow of Colorado River near Cisco increased seasonally and remained in the above-normal range for the 7th consecutive month. In the northern part of the State, monthly mean flows at the index stations, Weber River near Oakley and Big Cottonwood Creek near Salt Lake City, decreased to 66 and 76 percent of median, respectively, and were below the normal range.

Contents of the Colorado River Storage Project increased 2,956,300 acre-feet during the month.

In southern Wyoming, monthly mean flow increased into the above-normal range in North Platte River above Seminoe Reservoir, near Sinclair. In the northern part of the State, mean flow in tributaries to Yellowstone River, including Tongue River near Dayton, were generally less than median but within the normal range.

East of the Continental Divide in central Colorado, monthly mean discharge in Bear Creek at Morrison

increased seasonally as a result of snowmelt runoff, was 273 percent of median, and was above the normal range for only the second month since April 1977. Also in central Colorado but west of the Divide, mean flow in Roaring Fork River at Glenwood Springs increased sharply and was above the normal range for the first time since July 1978. In the Animas River basin of southwestern Colorado, monthly mean discharge of Animas River at Durango continued to increase seasonally and remained in the above-normal range for the 4th consecutive month and was nearly twice the median flow for June.

In northern New Mexico, mean flow in Rio Grande below Taos Junction Bridge, near Taos, increased in contrast to the normal seasonal pattern of decreasing flows, and remained in the above-normal range for the 4th consecutive month. In the north-central part of the State, mean discharge of Pecos River near Pecos (drainage area, 189 square miles) increased sharply, was 516 percent of median, and remained in the above-normal range for the 5th consecutive month. The monthly mean flow of 945 cfs, and the daily mean of 1,760 cfs on the 8th, were highest for June in 60 years of record. In the southeastern part of the State, mean flow of Delaware River near Red Bluff increased seasonally and was above the normal range for the 9th time in the past 10 months. In southwestern New Mexico, monthly mean flow of Gila River near Gila continued to decrease seasonally but remained in the above-normal range for the 8th consecutive month. Cumulative runoff at that station for the first 9 months of the 1979 water year was over 7 times median.

In southern Arizona, mean flow of San Pedro River at Charleston increased, contrary to the normal seasonal pattern of decreasing flow, was nearly 6 times median, and remained in the above-normal range for the 9th consecutive month. Elsewhere in the State, streamflow decreased seasonally and remained in the above-normal range for the 8th consecutive month at Gila River at head of Safford Valley, near Solomon, Little Colorado River near Cameron, Salt River near Roosevelt, and Verde River below Tangle Creek, above Horseshoe Dam. Cumulative runoff for the first 9 months of the 1979 water year ranged from 438 percent of median on the Verde River to over 15 times median on the Gila River near Solomon.

GROUND-WATER CONDITIONS

In Washington, the level in the observation well in Spokane, in the eastern part of the State, declined and was below average.

In Idaho, trends were mixed. A new low level for June was reached in the key well at Atomic City, and a new alltime low in 29 years of record was reached in the well at Rupert, in Minidoka County. The level in the well representative of the alluvial aquifer underlying the Rathdrum Prairie, northern Idaho, rose ½ foot but was 9½ feet below average.

In Montana, levels rose, were about average, and somewhat above the levels of a year ago.

In southern California, levels in key wells in Los Angeles and Orange Counties declined and continued below average. In Santa Barbara County, levels rose and continued above average in Santa Ynez and Upper Cuyama Valleys, and declined but continued above average in Santa Maria Valley. A new June high was reached in the Lompoc well in Santa Ynez Valley.

In Nevada, the level in the key well in Las Vegas Valley declined nearly 7 feet, again reaching a new alltime low in 33 years of record. Levels in the key wells in Paradise and Steptoe Valleys rose and declined, respectively; both continued above average. The level in the Truckee Meadows well rose but was below average.

In Utah, levels declined in the Holladay and Logan areas, setting a new low for June at the Holladay well in 31 years of record. Levels rose in the Flowell and Blanding areas; a new high for June was reached in the well at Blanding in 19 years of record. Levels continued below average except in the Blanding area, where they continued above average.

In Arizona, levels declined in four index wells and rose in one. A new low level for June was reached, for the sixth consecutive month, in the well in the Elfrida area in 28 years of record.

In New Mexico, three of the key wells declined seasonally. However, the level in Berrendo-Smith artesian well rose and was above average; the level in the Hrna water-table well in Mimbres Valley rose but continued below average. A new June low was reached in the Dayton water-table well, in the southern part of the Roswell basin, in 41 years of record.

ALASKA

Streamflow generally increased seasonally throughout the State and was within the normal range and slightly below median. However, at the index station on Little Susitna River near Palmer, mean flow continued to increase seasonally because of snowmelt runoff and remained in the above-normal range for the 5th consecutive month. In the central part of the State, monthly mean discharge in Chena River at Fairbanks decreased seasonally and remained in the normal range for the 7th consecutive month.

Ground-water levels in the confined-aquifer system near the Chugach foothills rose 2 to 4 feet during June. However, levels in the confined system elsewhere generally declined due to pumping. Levels increased up to 2 feet in the shallow water table during the month.

HAWAII

Streamflow increased, contrary to the normal seasonal pattern of decreasing flow, at index stations on the Islands of Kauai, Oahu, and Hawaii, but decreased seasonally on the Island of Maui. Monthly mean flow of Waiakea Stream near Mountain View (Island of Hawaii) increased sharply from the below-normal range in May to the above-normal range in June. After 2 months in the below-normal range, monthly mean discharge of Kalihi Stream near Honolulu (Island of Oahu) increased into the normal range but remained below median. Mean flow of East Branch of North Fork Wailua River near Lihue (Island of Kauai) also increased and was greater than median but remained within the normal range. On the Island of Maui, mean discharge of Honopou Stream near Huelo decreased seasonally, remained in the normal range, and also remained below median. Flow of Ylig River near Yona on the Island of Guam (Mariana Islands) decreased sharply into the below-normal range and was only 13 percent of median, following 6 consecutive months of flow in the normal range.

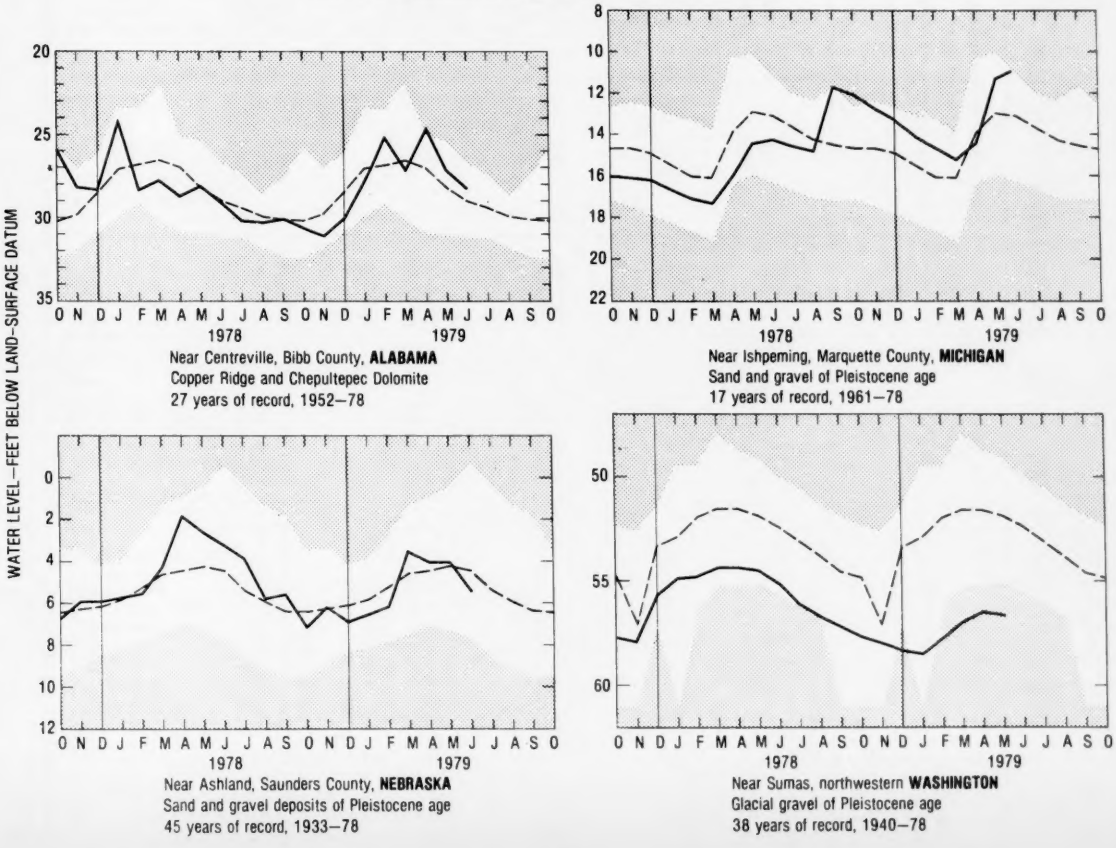
METRIC EQUIVALENTS OF UNITS USED IN THE WATER RESOURCES REVIEW

(Round-number conversions, to nearest four significant figures)

1 foot = 0.3048 meter 1 mile = 1.609 kilometers
1 acre = 0.4047 hectare = 4,047 square meters
1 square mile (sq mi) = 259 hectares = 2.59 square kilometers (sq km)
1 acre-foot (ac-ft) = 1,233 cubic meters
1 million cubic feet (mcf) = 28,320 cubic meters
1 cubic foot per second (cfs) = 0.02832 cubic meters per second = 1.699 cubic meters per minute
1 second-foot-day (cfsd) = 2,447 cubic meters
1 million gallons (mg) = 3,785 cubic meters = 3.785 million liters
1 million gallons per day (mgd) = 694.4 gallons per minute (gpm) = 2.629 cubic meters per minute = 3,785 cubic meters per day

MONTH-END GROUND-WATER LEVELS IN KEY WELLS

UNSHADED AREA INDICATES RANGE BETWEEN HIGHEST AND LOWEST RECORD FOR THE MONTH
DOTTED LINE INDICATES AVERAGE OF MONTHLY LEVELS, IN PREVIOUS YEARS
HEAVY LINE INDICATES LEVEL FOR CURRENT PERIOD



Near Centreville, Bibb County, **ALABAMA**
Copper Ridge and Chepultepec Dolomite
27 years of record, 1952—78

Near Ishpeming, Marquette County, **MICHIGAN**
Sand and gravel of Pleistocene age
17 years of record, 1961—78

Near Ashland, Saunders County, **NEBRASKA**
Sand and gravel deposits of Pleistocene age
45 years of record, 1933—78

Near Sumas, northwestern **WASHINGTON**
Glacial gravel of Pleistocene age
38 years of record, 1940—78

DISSOLVED SOLIDS AND WATER TEMPERATURES FOR JUNE AT DOWNSTREAM SITES ON SIX LARGE RIVERS

Station number	Station name	June data of following calendar years	Stream discharge during month	Dissolved-solids concentration during month[a]		Dissolved-solids discharge during month[a]			Water temperature during month[b]		
			Mean (cfs)	Minimum (mg/L)	Maximum (mg/L)	Mean	Minimum	Maximum	Mean, in °C	Minimum, in °C	Maximum, in °C
						(tons per day)					
	NORTHEAST										
01463500	Delaware River at	*1979	11,200	.....	.....	.....	.....	.....	.....	.....	.....
	Trenton, N.J.	1945–78	9,477	60	143	.....	495	22,100	.....	13.5	34.0
	(Morrisville, Pa.)	(Extreme yr)		(1945)	(1965)		(1965)	(1973)			
			[c]6,992								
04264331	St. Lawrence River at	1979	296,000	167	168	134,000	129,000	136,000	15.0	12.0	18.0
	Cornwall, Ontario, near	1976–78	306,300	166	169	138,000	110,000	159,000	15.0	11.5	17.5
	Massena, N.Y.	(Extreme yr)		(1976–78)	(1976)		(1977)	(1976)			
	median streamflow at Ogdensburg, N.Y.		[c]261,500								
	SOUTHEAST										
07289000	Mississippi River at	1979	784,800	209	241	468,000	339,000	579,000	26.0	22.0	27.5
	Vicksburg, Miss.	1976–78	446,900	219	316	189,000	34,400	429,000	25.0	17.0	31.0
		(Extreme yr)		(1977)	(1976)		(1978)	(1976)			
			[c]591,400								
	WESTERN GREAT LAKES REGION										
03612500	Ohio River at lock and dam	1979	285,800	187	246	.....	68,600	272,000	.....	21.0	26.5
	53, near Grand Chain, Ill.	1955–78	199,600	111	300	.....	27,000	328,000	.....	16.5	30.5
	(25 miles west of Paducah,	(Extreme yr)		(1974)	(1970)		(1977)	(1968)			
	Ky.; streamflow station		[c]174,600								
	at Metropolis, Ill.)										
	MIDCONTINENT										
06934500	Missouri River at Hermann,	1979	92,600	295	401	89,800	76,600	119,000	24.0	21.5	25.5
	Mo. (60 miles west of St.	1976–78	80,200	207	418	66,800	44,000	118,000	24.5	21.0	28.0
	Louis, Mo.)	(Extreme yr)		(1977)	(1977)		(1977)	(1978)			
			[c]109,600								
	WEST										
14128910	Columbia River at	1979	174,500	72	83	35,900	25,600	54,400	16.0	15.0	17.0
	Warrendale, Oreg.	1976–78	216,200	61	107	43,900	19,100	64,300	15.5	12.5	19.5
	(streamflow station	(Extreme yr)		(1976)	(1977)		(1977)	(1978)			
	at The Dalles, Oreg.)		[c]454,200								

[a]Dissolved-solids concentrations when not analyzed directly, are calculated on basis of measurements of specific conductance.
[b]To convert °C to °F: [(1.8 X °C) + 32] = °F.
[c]Median of monthly values for 30-year reference period, water years 1941–70, for comparison with data for current month.
*Dissolved-solids and water-temperature records not available.

USABLE CONTENTS OF SELECTED RESERVOIRS NEAR END OF JUNE 1979

[Contents are expressed in percent of reservoir capacity. The usable storage capacity of each reservoir is shown in the column headed "Normal maximum."]

Reservoir Principal uses: F–Flood control I–Irrigation M–Municipal P–Power R–Recreation W–Industrial	End of May 1979	End of June 1979	End of June 1978	Average for end of June	Normal maximum
	Percent of normal maximum				
NORTHEAST REGION					
NOVA SCOTIA					
Rossignol, Mulgrave, Falls Lake, St. Margaret's Bay, Black, and Ponhook Reservoirs (P)	91	90	73	71	226,300 (a)
QUEBEC					
Allard (P)	88	90	89	82	280,600 ac-ft
Gouin (P)	64	75	76	64	6,954,000 ac-ft
MAINE					
Seven reservoir systems (MP)	101	92	93	87	178,500 mcf
NEW HAMPSHIRE					
First Connecticut Lake (P)	92	92	92	96	3,330 mcf
Lake Francis (FPR)	94	86	91	87	4,326 mcf
Lake Winnipesaukee (PR)	116	94	101	96	7,220 mcf
VERMONT					
Harriman (P)	91	82	83	83	5,060 mcf
Somerset (P)	91	85	80	86	2,500 mcf
MASSACHUSETTS					
Cobble Mountain and Borden Brook (MP)	99	91	89	88	3,394 mcf
NEW YORK					
Great Sacandaga Lake (FPR)	99	90	89	92	34,270 mcf
Indian Lake (FMP)	99	103	98	101	4,500 mcf
New York City reservoir system (MW)	102	97	98	.....	547,500 mg
NEW JERSEY					
Wanaque (M)	103	95	96	89	27,730 mg
PENNSYLVANIA					
Allegheny (FPR)	49	48	49	49	51,400 mcf
Pymatuning (FMR)	98	95	100	97	8,191 mcf
Raystown Lake (FR)	68	67	68	57	33,190 mcf
Lake Wallenpaupack (PR)	81	71	82	86	6,875 mcf
MARYLAND					
Baltimore municipal system (M)	101	99	98	93	85,340 mg
SOUTHEAST REGION					
NORTH CAROLINA					
Bridgewater (Lake James) (P)	93	94	92	90	12,580 mcf
Narrows (Badin Lake) (P)	95	95	98	98	5,616 mcf
High Rock Lake (P)	87	86	84	78	10,230 mcf
SOUTH CAROLINA					
Lake Murray (P)	96	94	90	79	70,300 mcf
Lakes Marion and Moultrie (P)	88	89	85	74	81,100 mcf
SOUTH CAROLINA--GEORGIA					
Clark Hill (FP)	84	79	75	73	75,360 mcf
GEORGIA					
Burton (PR)	100	98	99	91	104,000 ac-ft
Sinclair (MPR)	85	76	86	91	214,000 ac-ft
Lake Sidney Lanier (FMPR)	66	65	63	63	1,686,000 ac-ft
ALABAMA					
Lake Martin (P)	100	100	98	91	1,373,000 ac-ft
TENNESSEE VALLEY					
Clinch Projects: Norris and Melton Hill Lakes (FPR)	73	74	66	62	1,156,000 cfsd
Douglas Lake (FPR)	89	87	70	67	703,100 cfsd
Hiwassee Projects: Chatuge, Nottely, Hiwassee, Apalachia, Blue Ridge, Ocoee 3, and Parksville Lakes (FPR)	94	91	76	81	510,300 cfsd
Holston Projects: South Holston, Watauga, Boone, Fort Patrick Henry, and Cherokee Lakes (FPR)	86	88	69	67	1,452,000 cfsd
Little Tennessee Projects: Nantahala, Thorpe, Fontana, and Chilhowee Lakes (FPR)	95	94	70	83	745,200 cfsd
WESTERN GREAT LAKES REGION					
WISCONSIN					
Chippewa and Flambeau (PR)	97	97	96	87	15,900 mcf
Wisconsin River (21 reservoirs) (PR)	92	92	87	82	17,400 mcf
MINNESOTA					
Mississippi River headwater system (FMR)	44	33	37	40	1,640,000 ac-ft
MIDCONTINENT REGION					
NORTH DAKOTA					
Lake Sakakawea (Garrison) (FIPR)	92	92	96	95	22,700,000 ac-ft
SOUTH DAKOTA					
Angostura (I)	97	96	100	91	127,600 ac-ft
Bell Fourche (I)	92	80	99	71	185,200 ac-ft
Lake Francis Case (FIP)	80	80	82	84	4,834,000 ac-ft
Lake Oahe (FIP)	97	98	97	.....	22,530,000 ac-ft
MIDCONTINENT REGION Continued					
SOUTH DAKOTA--Continued					
Lake Sharpe (FIP)	102	103	102	99	1,725,000 ac-ft
Lewis and Clarke Lake (FIP)	79	81	77	88	477,000 ac-ft
NEBRASKA					
Lake McConaughy (IP)	75	77	74	79	1,948,000 ac-ft
OKLAHOMA					
Eufaula (FPR)	104	110	103	93	2,378,000 ac-ft
Keystone (FPR)	106	106	108	103	661,000 ac-ft
Tenkiller Ferry (FPR)	105	106	113	100	628,200 ac-ft
Lake Altus (FIMR)	73	93	99	69	134,600 ac-ft
Lake O'The Cherokees (FPR)	102	101	99	95	1,492,000 ac-ft
OKLAHOMA--TEXAS					
Lake Texoma (FMPRW)	104	103	100	101	2,722,000 ac-ft
TEXAS					
Bridgeport (IMW)	50	52	61	52	386,400 ac-ft
Canyon (FMR)	100	100	95	75	385,600 ac-ft
International Amistad (FIMPW)	100	103	86	76	3,497,000 ac-ft
International Falcon (FIMPW)	100	100	69	64	2,668,000 ac-ft
Livingston (IMW)	105	100	95	83	1,788,000 ac-ft
Possum Kingdom (IMPRW)	95	95	86	100	569,400 ac-ft
Red Bluff (PI)	33	30	10	27	307,000 ac-ft
Toledo Bend (P)	100	98	93	89	4,472,000 ac-ft
Twin Buttes (FIM)	64	60	74	26	177,800 ac-ft
Lake Kemp (IMW)	57	63	59	95	268,000 ac-ft
Lake Meredith (FMW)	30	31	40	39	821,300 ac-ft
Lake Travis (FIMPRW)	99	98	57	80	1,144,000 ac-ft
THE WEST					
WASHINGTON					
Ross (PR)	70	94	99	89	1,052,000 ac-ft
Franklin D. Roosevelt Lake (IP)	70	91	87	102	5,022,000 ac-ft
Lake Chelan (PR)	64	93	96	97	676,100 ac-ft
Lake Cushman	101	103	102	98	359,500 ac-ft
Lake Merwin (P)	105	105	102	105	245,600 ac-ft
IDAHO					
Boise River (4 reservoirs) (FIP)	90	81	82	90	1,235,000 ac-ft
Coeur d'Alene Lake (P)	132	100	100	84	238,500 ac-ft
Pend Oreille Lake (FP)	94	100	99	98	1,561,000 ac-ft
IDAHO--WYOMING					
Upper Snake River (8 reservoirs) (MP)	84	80	90	85	4,401,000 ac-ft
WYOMING					
Boysen (FIP)	69	78	96	88	802,000 ac-ft
Buffalo Bill (IP)	56	84	102	103	421,300 ac-ft
Keyhole (F)	85	83	86	50	199,900 ac-ft
Pathfinder, Seminoe, Alcova, Kortes, Glendo, and Guernsey Reservoirs (I)	66	74	69	63	3,056,000 ac-ft
COLORADO					
John Martin (FIR)	1	2	0	19	364,400 ac-ft
Taylor Park (IR)	43	95	66	95	106,200 ac-ft
Colorado–Big Thompson project (I)	54	74	56	75	722,600 ac-ft
COLORADO RIVER STORAGE PROJECT					
Lake Powell; Flaming Gorge, Fontenelle, Navajo, and Blue Mesa Reservoirs (IFPR)	77	86	72	.....	31,620,000 ac-ft
UTAH--IDAHO					
Bear Lake (IPR)	80	79	72	70	1,421,000 ac-ft
CALIFORNIA					
Folsom (FIP)	99	92	94	89	1,000,000 ac-ft
Hetch Hetchy (MP)	72	100	88	81	360,400 ac-ft
Isabella (FIR)	70	74	87	44	570,000 ac-ft
Pine Flat (FI)	94	91	86	69	1,001,000 ac-ft
Clair Engle Lake (Lewiston) (P)	85	86	79	89	2,438,000 ac-ft
Lake Almanor (P)	78	79	96	64	1,036,000 ac-ft
Lake Berryessa (FIMW)	77	74	79	84	1,600,000 ac-ft
Millerton Lake (FI)	92	93	77	82	503,200 ac-ft
Shasta Lake (FIPR)	100	92	99	87	4,377,000 ac-ft
CALIFORNIA--NEVADA					
Lake Tahoe (IPR)	32	35	34	73	744,600 ac-ft
NEVADA					
Rye Patch (I)	60	66	38	66	194,300 ac-ft
ARIZONA--NEVADA					
Lake Mead and Lake Mohave (FIMP)	86	85	80	72	27,970,000 ac-ft
ARIZONA					
San Carlos (IP)	100	95	18	14	1,073,000 ac-ft
Salt and Verde River system (IMPR)	99	95	87	44	2,073,000 ac-ft
NEW MEXICO					
Conchas (FIR)	32	40	33	78	352,600 ac-ft
Elephant Butte and Caballo (FIPR)	23	31	12	29	2,539,000 ac-ft

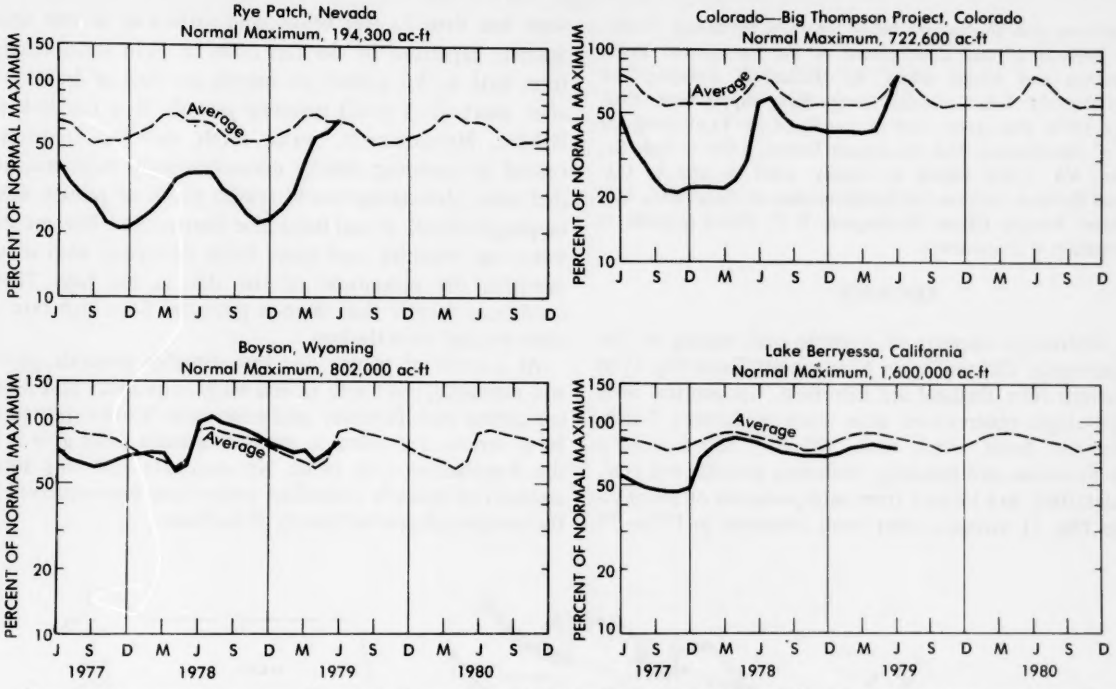
[a] Thousands of kilowatt-hours (the potential electric power that could be generated by the volume of water in storage).

FLOW OF LARGE RIVERS DURING JUNE 1979

Station number*	Stream and place of determination	Drainage area (square miles)	Mean annual discharge through September 1975 (cfs)	June 1979					
				Monthly discharge (cfs)	Percent of median monthly discharge, 1941–70	Change in discharge from previous month (percent)	Discharge near end of month		
							(cfs)	(mgd)	Date
1–0140	St. John River below Fish River at Fort Kent, Maine	5,690	9,549	15,790	169	-50	5,100	3,300	30
1–3185	Hudson River at Hadley, N.Y	1,664	2,853	1,950	84	-57	540	350	30
1–3575	Mohawk River at Cohoes, N.Y	3,456	5,630	2,634	86	-58	.....	.....	.....
1–4635	Delaware River at Trenton, N.J	6,780	11,630	11,204	160	-24	4,950	3,200	27
1–5705	Susquehanna River at Harrisburg, Pa	24,100	34,200	22,770	99	-41	11,900	7,690	25
1–6465	Potomac River near Washington, D.C	11,560	[1] 11,190	14,500	196	-16	4,400	2,840	30
2–1055	Cape Fear River at William O. Huske Lock near Tarheel, N.C	4,810	5,007	5,251	270	-24	2,269	1,470	30
2–1310	Pee Dee River at Peedee, S.C	8,830	9,657	14,700	249	+10	19,900	12,900	28
2–2260	Altamaha River at Doctortown, Ga	13,600	13,780	6,924	81	-68	5,120	3,310	30
2–3205	Suwannee River at Branford, Fla	7,880	6,970	5,530	111	-32	5,070	3,280	29
2–3580	Apalachicola River at Chattahoochee, Fla	17,200	22,330	15,700	95	-40	12,600	8,140	29
2–4670	Tombigbee River at Demopolis lock and dam near Coatopa, Ala	15,400	22,570	13,180	206	-37	9,700	6,270	28
2–4895	Pearl River near Bogalusa, La	6,630	9,263	5,503	154	-64	3,180	2,060	30
3–0495	Allegheny River at Natrona, Pa	11,410	[1] 19,210	8,514	75	-45	3,240	2,090	25
3–0850	Monongahela River at Braddock, Pa	7,337	[1] 12,360	6,370	101	-66	3,050	1,970	25
3–1930	Kanawha River at Kanawha Falls, W.Va	8,367	12,530	17,100	254	-15	23,400	15,100	26
3–2345	Scioto River at Higby, Ohio	5,131	4,513	3,874	190	+46	2,140	1,380	26
3–2945	Ohio River at Louisville, Ky[2]	91,170	114,100	117,220	192	-8	147,700	95,500	26
3–3775	Wabash River at Mount Carmel, Ill	28,635	27,030	22,460	106	-31	21,000	13,600	30
3–4690	French Broad River below Douglas Dam, Tenn	4,543	[1] 6,794	5,189	111	-33	.....	.....	.....
4–0845	Fox River at Rapide Croche Dam, near Wrightstown, Wis[2]	6,150	4,185	5,820	154	-50	.....	.....	.....
02MC002 (4–2643.31)	St. Lawrence River at Cornwall, Ontario–near Massena, N.Y[3]	299,000	241,100	296,000	113	+2	285,000	184,000	30
050115	St. Maurice River at Grand Mere, Quebec	16,300	25,300	39,500	131	-44	20,800	13,400	29
5–0825	Red River of the North at Grand Forks, N. Dak	30,100	2,524	5,900	130	-68	7,800	5,040	30
5–1335	Rainy River at Manitou Rapids, Minn	19,400	12,950	29,600	142	-9	28,000	18,100	22
5–3300	Minnesota River near Jordan, Minn	16,200	3,412	6,987	127	-53	9,000	5,800	25
5–3310	Mississippi River at St. Paul, Minn	36,800	[1] 10,580	22,570	127	-53	27,500	17,800	25
5–3655	Chippewa River at Chippewa Falls, Wis	5,600	5,110	7,530	135	-26	.....	.....	.....
5–4070	Wisconsin River at Muscoda, Wis	10,300	8,613	13,900	142	-17	8,000	5,200	30
5–4465	Rock River near Joslin, Ill	9,551	5,852	7,530	137	-47	5,440	3,520	30
5–4745	Mississippi River at Keokuk, Iowa	119,000	62,570	100,470	116	-45	100,800	65,100	30
6–2145	Yellowstone River at Billings, Mont	11,796	6,986	23,200	88	+100	25,000	16,200	30
6–9345	Missouri River at Hermann, Mo	524,200	79,750	91,920	84	-22	87,000	56,200	25
7–2890	Mississippi River at Vicksburg, Miss[4]	1,140,500	573,600	784,800	133	-41	520,000	336,000	30
7–3310	Washita River near Durwood, Okla	7,202	1,414	5,756	340	+282	900	580	30
8–2765	Rio Grande below Taos Junction Bridge, near Taos, N. Mex	9,730	724	5,506	725	+63	4,600	3,000	30
9–3150	Green River at Green River, Utah	40,600	6,366	17,665	95	+3	10,000	6,500	30
11–4255	Sacramento River at Verona, Calif	21,257	19,150	8,800	83	-25	10,300	6,660	30
13–2690	Snake River at Weiser, Idaho	69,200	18,170	9,874	40	-32	9,170	5,930	26
13–3170	Salmon River at White Bird, Idaho	13,550	11,290	23,850	62	-17	17,200	11,100	26
13–3425	Clearwater River at Spalding, Idaho	9,570	15,570	29,350	80	-33	21,500	13,900	26
14–1057	Columbia River at The Dalles, Oreg[5]	237,000	194,600	336,300	71	-15	.....	.....	.....
14–1910	Willamette River at Salem, Oreg	7,280	23,810	7,634	57	-72	6,730	4,350	26–30
15–5155	Tanana River at Nenana, Alaska	25,600	23,850	39,337	83	+10	46,000	29,700	30
8MF005	Fraser River at Hope, British Columbia	83,800	96,400	225,000	91	+31	199,000	129,000	28

[1] Adjusted.
[2] Records furnished by Corps of Engineers.
[3] Records furnished by Buffalo District, Corps of Engineers, through International St. Lawrence River Board of Control. Discharges shown are considered to be the same as discharge at Ogdensburg, N.Y. when adjusted for storage in Lake St. Lawrence.
[4] Records of daily discharge computed jointly by Corps of Engineers and Geological Survey.
[5] Discharge determined from information furnished by Bureau of Reclamation, Corps of Engineers, and Geological Survey.
*The U.S. station numbers as listed in this table are in a shortened form previously in use, and used here for simplicity of tabular and map presentation. The full, correct number contains 8 digits and no punctuation marks. For example, the correct form for station number 1–3185 is 01318500.

USABLE CONTENTS OF SELECTED RESERVOIRS AND RESERVOIR SYSTEMS, JUNE 1977 TO JUNE 1979



Near- or above-average contents characterized most reservoirs in the United States during June. Contents were near average in Rye Patch, Nevada and Colorado-Big Thompson Project, Colorado for the first time since mid-1976. (See graphs above.)

WATER RESOURCES REVIEW

June 1979

Based on reports from the Canadian and U.S. field offices; completed July 10, 1979

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EXPLANATION OF DATA

Cover map shows generalized pattern of streamflow for June based on 20 index stream-gaging stations in Canada and 130 index stations in the United States. Alaska and Hawaii inset maps show streamflow only at the index gaging stations which are located near the points shown by the arrows.

Streamflow for June 1978 is compared with flow for June in the 30-year reference period 1941–70. Streamflow is considered to be *below the normal range* if it is within the range of the low flows that have occurred 25 percent of the time (below the lower quartile) during the reference period. Flow for June is considered to be *above the normal range* if it is within the range of the high flows that have occurred 25 percent of the time (above the upper quartile).

Flow higher than the lower quartile but lower than the upper quartile is described as being *within the normal range.* In the Water Resources Review the median is obtained by ranking the 30 flows of the reference period in their order of magnitude; the highest flow is number 1, the lowest flow is number 30, and the average of the 15th and 16th highest flows is the median.

The normal is an average (but not an arithmetic average) or middle value; half of the time you would expect the June flows to be below the median and half of the time to be above the median. Shorter reference periods are used for the Alaska index stations because of the limited records available.

Statements about *ground-water levels* refer to conditions near the end of June. Water level in each key observation well is compared with average level for the end of June determined from the entire past record for that well or from a 20-year reference period, 1951–70. *Changes in ground-water levels,* unless described otherwise, are from the end of May to the end of June.

The Water Resources Review is published monthly. Special-purpose and summary issues are also published. Issues of the Review are free on application to the Water Resources Review, U.S. Geological Survey, Reston, Virginia 22092.

GEOHYDROLOGIC IMPACTS OF COAL DEVELOPMENT IN THE NARRAGANSETT BASIN, MASSACHUSETTS AND RHODE ISLAND

The abstract and illustrations below are from the report, *Geohydrologic impacts of coal development in the Narragansett Basin, Massachusetts and Rhode Island*, by Michael H. Frimpter and Anthony Maevsky: U.S. Geological Survey Water-Supply Paper 2062, 35 pages, 1979. This report may be purchased for $1.60 from the Branch of Distribution, U.S. Geological Survey, 1200 S. Eads St., Arlington, VA 22202 (check or money order payable to U.S. Geological Survey); or from the Superintendent of Documents, U.S. Government Printing Office, Washington, D. C. 20402 (payable to Superintendent of Documents).

ABSTRACT

The hydrologic impacts of possible coal mining in the 900-square-mile Carboniferous Narragansett Basin (fig. 1) in southeastern New England are described. Geophysical tests and hydrologic observations were made in thirteen 3-inch-diameter test holes which were 330 to 1,500 feet deep (fig. 2). Fractures and lithology, including graphite and coal, were identified and located from interpretation of geophysical logs (fig. 3). Ground-water levels measured in 1976–77 were less than 15 feet below land surface at all test sites. Specific capacities of the test holes to yield water ranged from 0.01 to 5.7 gallons per minute per foot of drawdown after short (2–5 hour) pumping periods. In a test hole in Halifax, Massachusetts, water levels showing drawdown caused by pumping nearby domestic-supply wells indicate that mine dewatering would reduce yields of private wells tapping bedrock. In test holes near Narragansett Bay, ground water was brackish, and water levels fluctuated with about one-fifth the magnitude of the tide in the bay. These conditions suggest that there is potential for a high rate of mine seepage from the bay.

As a result of mining, the iron disulfide minerals, pyrite and marcasite, react with air and water to produce acid water containing iron. However, acid mine water is not expected to be as serious a problem in the Narragansett Basin as it is in the Appalachian coal fields. No marcasite and only small amounts of coarsely crystalline pyrite have been observed in the metamorphosed sediments of the basin.

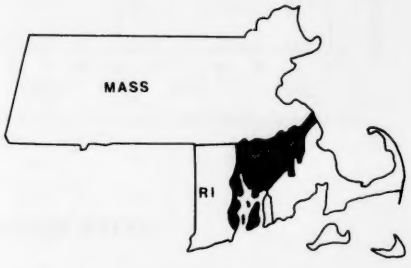

Figure 1.—Narragansett Basin, Massachusetts and Rhode Island.

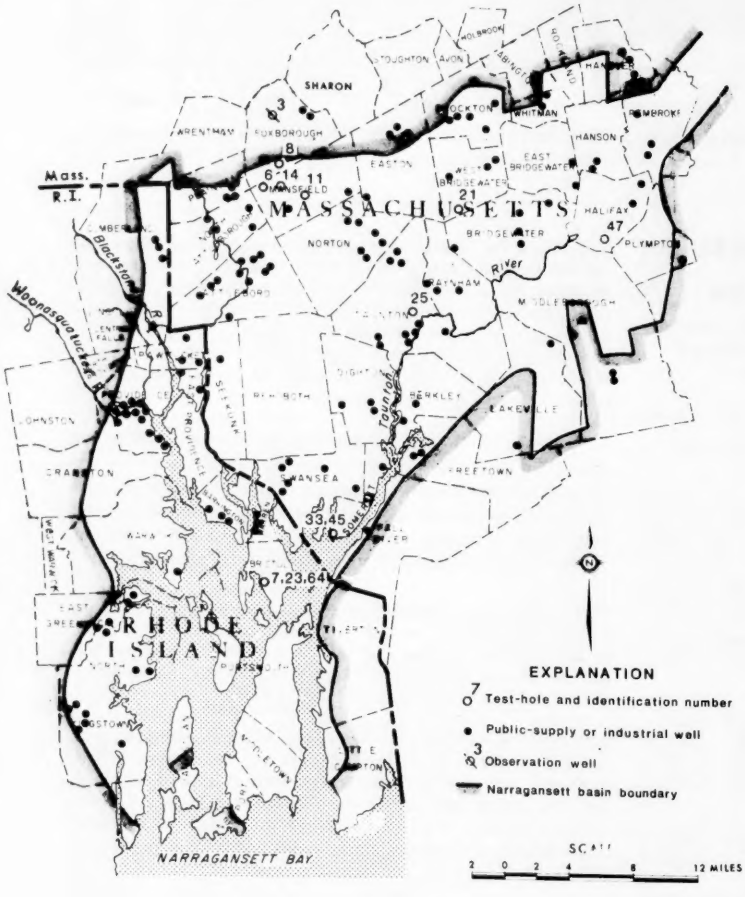

Figure 2.—Map of industrial- and public-supply wells and coal test holes.

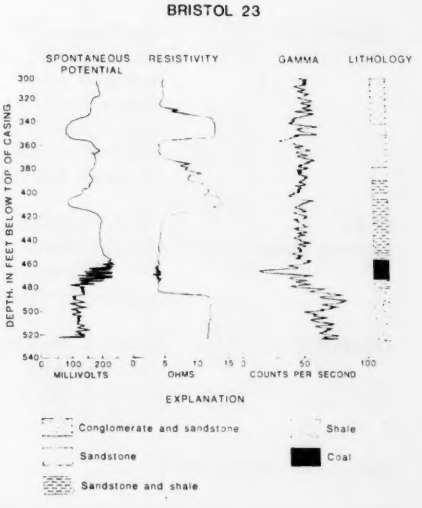

Figure 3.—Self-potential, resistivity, and natural gamma logs (Bristol 23).